

A Grain Size Threshold for Quantifying Active Sediment Input: A Case Study of Maha Oya River in the Western Coast of Sri Lanka

***Jayathilaka^{1,4} RMRM, Ratnayake¹ NP, Wijyaratna² TMN and Silva³ KBA**

¹Department of Earth Resources Engineering, University of Moratuwa, Sri Lanka

²Department of Civil Engineering, University of Moratuwa, Sri Lanka

³Department of Construction Technology, Wayamba University of Sri Lanka

⁴The National Aquatic Resources Research and Development Agency (NARA), Sri Lanka

*Corresponding author - ruchira.jayathilaka@gmail.com

Rivers have a significant role in the coastal sediment budget as the primary sources of natural sediment. Further, it is essential to comprehend the minimum grain size threshold, also known as the littoral cutoff diameter (LCD), in order to determine the actual contribution of river sediment load to the littoral beach. This study aims to present the LCD as a crucial variable worth taking into account at the regional level when budgeting for littoral sediments. Maha Oya River located on a severely eroding coastline between Negombo and Chilaw on the western coast of Sri Lanka was focus in this study. Here, we collected forty-four beach samples from the swash zone and berm crest during two sediment sampling surveys in March and October 2022. Concurrently, a streamer-type sediment trap was placed at 2 km upper streams of Maha Oya River to capture the bottom to 1.5 meters river sediment load. Sediment samples were sieved by mechanical sieving method in the classic Wentworth grain size scale (63-2000 μm). Additionally, the statistical properties of a grain size distribution, including LCD, skewness, kurtosis, and median grain size (D50), were investigated for sediment samples. Average D50 value on the beach was found to be 394 μm of medium sand that was moderately sorted, symmetrical, and mesokurtic, compared to 655 μm of coarse sand that was poorly sorted, fine skewed, and mesokurtic in river sediment. The LCD values was 141 μm on the beach studied herein, that indicated 10% of the river sediment in the lowest 1.5 m layer may not have remained on the beach in any significant quantity. Therefore, by using the concept of LCD, it is possible to quantify the potential overestimation of river sediment loads to the coastal sediment budget.

Keywords: Grain-size, LCD, Littoral beach, Sediment budget, Wentworth scale